

Chapter 2 GD&S Applications in USACE

2-1. Introduction

a. This chapter is intended to provide the reader with a feel for the variety of Geospatial Data and Systems (GD&S) applications in USACE. This chapter begins with the project development process in USACE as it relates to GD&S. The types of GD&S projects at the District, Division, Headquarters, and Laboratory levels are then discussed. Information on the many application areas and the Districts where they occur is presented, along with several typical and atypical sample applications.

b. A Geospatial Data System (GDS) has been defined as the computer hardware and software used to input, store, retrieve, manipulate, analyze, and plot/print geospatially (geographically) referenced digital data, referred to as Geospatial Data. Collectively these are referred to as GD&S for Geospatial Data and Geospatial Data System. GD&S is one of the fastest growing technologies and has changed the way USACE operates. GD&S technology provides a tool for planners, resource managers, engineers, scientists, real estate specialists, and others to perform complex analyses faster and more reliably than ever before. More types of data can be archived, retrieved and studied, making it possible to examine both new and old problems in a more comprehensive way. Even hardcopy products, such as maps and photographs, can be scanned or features can be extracted to allow more advanced processing.

c. Data sharing capability among geospatial data users in a geographical region is important. USACE Districts and Divisions may be called upon to share geospatial data with other Federal agencies, State and Local governments, and municipalities more often than with other USACE commands. Also, billions of dollars are spent annually by federal, state and local governments, and industry developing databases that could be used by USACE. The ability to incorporate geospatial data developed by organizations is vital if USACE is to cost-effectively and rapidly implement GD&S technology.

d. USACE has a great diversity of GD&S applications including Wetlands Permitting and Analysis, Environmental Restoration, Resource Management, Habitat Analyses, Environmental Change Detection, Aquatic Plant Tracking, Historical Preservation, Hydrology and Hydraulics, Channel/Inland Waterways Maintenance, Emergency Response, Flood Plain Mapping, Real Estate/Cadastral, Master Planning, District/Construction Management, Socio-economic Analysis, and Geologic/Geomorphic Analysis.

These applications support both the USACE civil and military missions. These applications emphasize providing access to geospatial data and rendering the data into information through: (1) quantitative and qualitative analyses, and (2) visual products.

2-2. The GD&S Development Process in USACE

GD&S technology is an enabler that may belong in many offices. It should not be viewed as exclusive to one portion of a USACE Command, but should be diffused throughout the Command to those functions where it is useful.

2-3. USACE GD&S Application Categories

a. *District GD&S Application Categories.* GD&S at the District level is employed for geospatial data analysis in support of engineering projects. Numerous District level data sets are geospatial in nature and are best accessed and managed by using GD&S technologies. Among the means of access are visualization, spatial query and geospatial data layer integration. These technologies support basic analysis and can provide modeling support. The result is a focusing of resources to support both quantitative and qualitative decision making in the District mission areas and the preparation of decision support materials for the Division and Headquarters.

b. *Division and Headquarters GD&S Application Categories.* GD&S at the Division and Headquarters level is not one of analysis but the visualization and display of District geospatial analytical products for USACE-wide or corporate decisions. This is essentially an Executive Briefing System.

c. *Laboratory GD&S Application Categories.* GD&S at the laboratory level is complex with many unique analysis and modeling applications in a variety of advanced research areas and for project support to districts. The results are again subject to review at Headquarters through visualization and query. Laboratory efforts are also directed to the development of configuration managed geospatial applications for the civil side of USACE. Advanced GD&S projects at USACE Laboratories include terrain visualization, modeling and simulation of environmental phenomena, hyper-spectral analysis of imagery to support change detection, and applications research.

d. *Sample GD&S.* There are many application areas for GD&S in USACE. A typical application is real estate land records management. Tract data can be entered into a GD&S for all USACE-owned lands. Attribute data includes values such as parcel numbers, ownership status, dates when interests were acquired and easements. Accuracy of data is best maintained at the cadastral level to support real estate

management [North Central Division Implementation Plan, 1989].

Occasionally there are atypical applications as well. These are applications which are unique to a particular USACE Command because of its unique mission or capabilities. One example is the prediction of ice jam flooding by the Cold Regions Research and Engineering Laboratory (CRREL).